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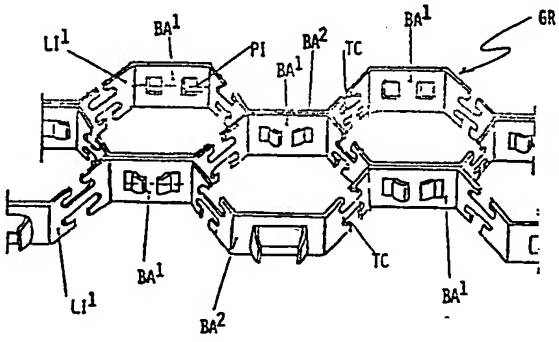
(54) **Improved hex mesh for reinforcement of monolithic refractory linings for petrochemical plants, chimneys, cyclone-reactors and the like.**

(57) In a hex-mesh structure (GR) as for example the type described in Patent Application Nr. 25730 A/81 by the same inventor, the shaped strib elements, which form the four sides not provided with fastening prongs (LI) for making connections, have special punched-out portions (TC) instead of a slot.

The special shape's minimum moment of interdia provides reduce stiffness for the hexagonal structure and avoids the formation of gabs between the fastened portions which are difficult to fill with refractory material when installation is carried out on cylindrical surfaces having small radii, or tapered surfaces or any kind of spherical surface.



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IMPROVED HEX MESH FOR REINFORCEMENT OF MONOLITHIC REFRACTORY LININGS FOR PETROCHEMICAL PLANTS, CHIMNEYS, CYCLONE-REACTORS AND THE LIKE.

This invention concerns the improvements made on steel hex mesh for the reinforcement of refractory linings to be used for petrolchemical plants, reactors, chimneys, cyclones and the like.

This invention applies to hexagonal shaped reinforcement made of carbon steel, alloy steel or stainless steel and which is capable of supporting and reinforcing monolithic refractory, anti-erosion or anti-acid linings.

These reinforcements are frequently welded into cylindrical surfaces that very often have very small radii of curvature, or are welded into tapered surfaces, into spherical surfaces or into dished surfaces with knockle radii being even as small as from 80-100 mm.

During calendering and forming of the standard type of hex mesh, the strips, which form the sides of the hexagonals not involved in the fastenining, are deformed as shown in Figs. 2 and 4. This deformation causes the formation of a gap IN between the sides of the strip that are clinched together.

These gaps have proved to be undesirable because the anti-abrasive refractory material which is poured, cannot penetrate into the gaps. This causes erosion

and abrasion to take place and seriously affect the sealing and compactness of the anti-erosion and abrasion to take place and seriously affect the sealing and compactness of the anti-erosion refractory linings.

The danger of the infiltration of gas into the aforesaid gaps, which would threaten the integrity of the wall, is also not to be underestimated.

This invention concerns modification of the hexagonal structure so that when the structure undergoes calendering and forming all the deformation occurs in the sections containing the special cut-outs.

According to this invention, the reinforcement mesh consisting of formed strips of steel clinched together to form a hex mesh structure, is characterized by the fact that the four oblique sides of the mesh, which are not engaged in the clinching, have special punched-out portions designed to so reduce the moment of inertia and resistence to bending as to avoid the formation of gaps between the clinched sides, thus facilitating the desired deformation and hex-mesh shaping of the reinforcement structure, particularly as regards the avoidance of the gap and the maintenance of the perfect hexagonal link shape.

The above mentioned characteristics, as well as others which include the scope and advantages of the invention, are better seen through the following

description of its construction, illustrated in the attached drawings, where:

Fig. 1 shows part of a hex mesh described in the previous Patent Nr. 25730 A/81, applied for by this inventor, but this does not constitute any limitation as regards the application of this invention to any other type of reinforcement mesh even those having different clinching methods;

Figures 2, 3 and 4 are, respectively, top, front and IV-IV section views and schematically show the deformation which occurs after calendering (shaping) and the resultant formation of gap IN;

Fig. 5 shows, as does Fig. 1, a hexagonal mesh showing the punched-out portions as located on the basic steel strip from which the hex mesh is constructed;

Fig. 6 is a plan view of hexagonal mesh;

Figures 7 and 8 show the previous type of standard cut-out (for the sides not engaged in the clinching);

Figures 9 and 10 show this new type of cut-out, which is also a punching operation, covered by this invention.

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Reference has alresdy been made to Figs. 1, 2, 3 and 4 to show that the high moment of inertia of the hex

mesh GR, taken about the centerline PI, which is parallel to the surface of the wall being reinforced, causes hex mesh deformations which result in the formation of the gaps IN. The scope of this invention is to eliminate the gap completely or, at least, reduce it to an acceptable minimum value with respect to the curvature that the hex mesh is given by calendering.

Sides BA^1 and BA^2 in the referenced figures are the sides that are involved in the clinching together of the hexagonal elements of the hex mesh. The fastening can be done in any know way as, for example, described in the inventor's Patent Application Nr. 25730 A/81. The sides not involved in the clinching are indicated as LI. The AS slots in these sides, which are formed by conventional methods, give the sides a high moment of inertia (see example further ahead).

The consequences of this high moment of inertia are that, during calendering and/or shaping operations, the gaps IN occur between the clinched sides. The gaps do not become filled, or even partially filled, with lining material during the pouring, which results in fine, vacant fissures. These fissures prevent the supporting wall from being completely and properly protected because of the absence of lining material in those fissures. This invention eliminates this problem

by providing the cut-outs IC in the shape of the letter omega (Ω), in the sides LI[1]. These cut-outs reduce the moment of inertia of these sides LI[1] which not only permit easier deformation of the whole hex mesh but, also, pratically eliminates the formation of the aforesaid gaps.

It is observated that, after calendering sections with the cut-outs, these deform and diverge from their plane, thus improving the hex mesh grip on the refractory lining.

From the above-said, the following prerogatives and characteristics of the invention are evident:

1. The amount of stress necessary during calendering and shaping is highly reduced.
2. Even with wall curvatures having very small radii, the perfect hexagonal shape of the hex mesh does not change in any way whatsoever during calendering.
3. There is no change in the developed length of a panel during calendering and shaping, highly simplifying the relative size calculations.
4. The stresses imposed on the clinched tabs during calendering are reduced to a minimum. This is also true regardless of the type of fastening used.

The following example is given for clarity, with reference to Figs. 7 and 10.

The advantage of this invention over the previous type of hex mesh is shown by an examination of the

cross-section of one of the four sides of the hexagon which is not involved in the clinching. For semplicity, let us consider this cross-section as subjected only to a bending stress; actually, both bending and twisting stresses are applied to the cross-section during the calendering and shaping operations.

In the former type, the section modulus of the cross section Fig. 8 is:

$$S = b\,\frac{(H^2 - h^2)}{6} = 2\,\frac{(19^2 - 7{,}8^2)}{6} = 100{,}053\ mm^3$$

The moment of inertia with respect to the horizontal centroidal axis is:

$$I = b\,\frac{(H^3 - h^3)}{12} = 2\,\frac{(19^3 - 7{,}8^3)}{12} = 1064\ mm^4$$

The cross-section shown in Fig. 10 has the following section modulus:

$$S = b\,\frac{h^2}{6} = 2\,\frac{6^2}{6} = 12\ mm^3$$

The moment of inertia with respect to the horizontal centroidal axis is:

$$I = b\,\frac{h^3}{12} = 2\,\frac{6^3}{12} = 36\ mm^4$$

The scope of advantages of the invention are clearly evident from what has been said above.

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C L A I M S

1. A hex mesh with hexagonal elements, made from formed steel strips, which are fastened together to for a hex mesh structure, characterized by the fact that the four sides not involved in the clinching have cut-outs which are designed to considerably reduce the section modulus and moment of inertia with respect to the horizontal centroidal axis, thus preventing the formation of gaps between the mating sides that are clinched together and, furthermore, facilitating the bending and shaping of the hex mesh, the sides that are not clinched together having two cut-outs in the form of the letter omega (Ω).

2. Ã hex mesh, in accordance with claim 1 and/or claim 1, characterized by the fact that the cut-outs are located symmetrically with relation to the longitudinal and transverse axis of the strip portions not engaged in the clinching.

3. A reinforcement for monolithic refractory linings consisting of the hex mesh according to claims 1 to 2.

4. Chimneys, cyclones, reactors, regenerators, piping, wing chambers, air distributors and, in general, wherever hex mesh according to claims 1 to 3 is applicable.

5. A hex mesh according to claims 1 through 4, in conformance with the attached drawings and the objectives indicated in the Abstract.

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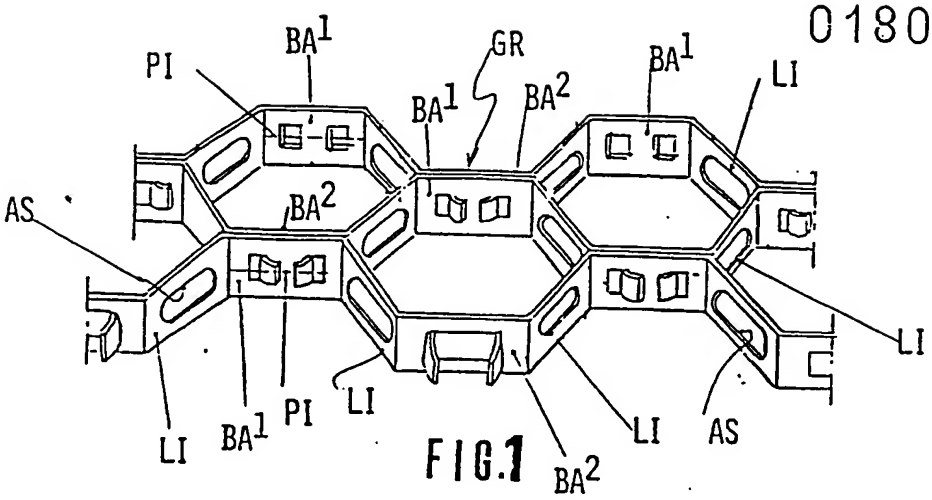

FIG.1

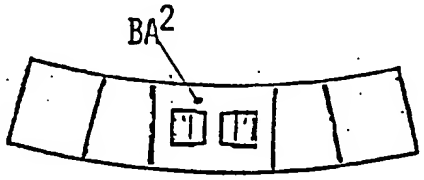

FIG.2

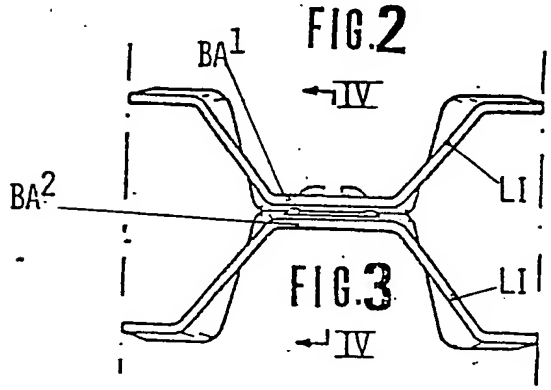

FIG.3

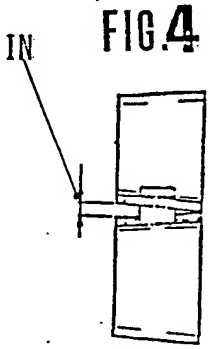

FIG.4

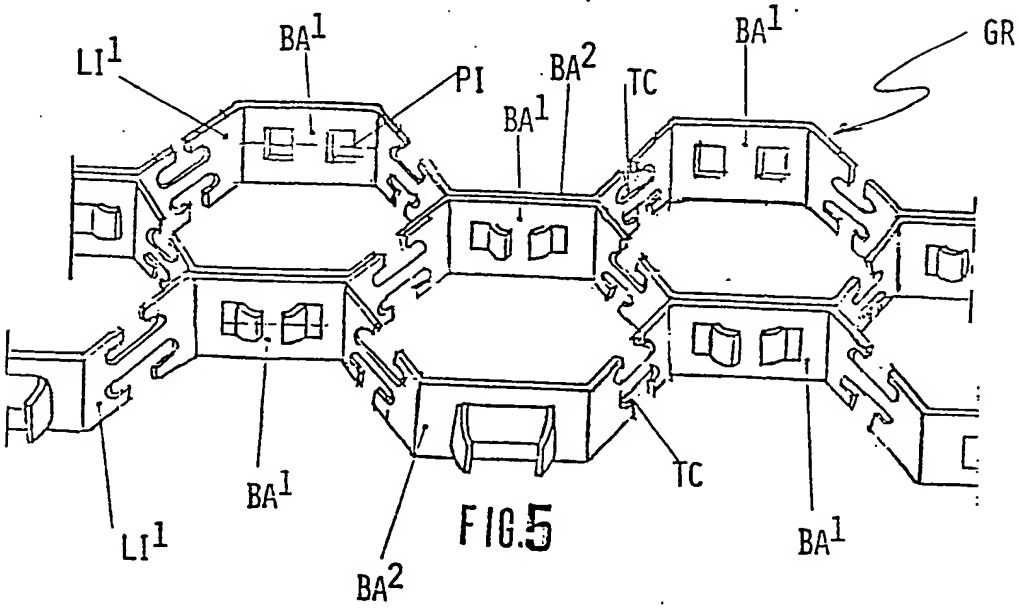

FIG.5

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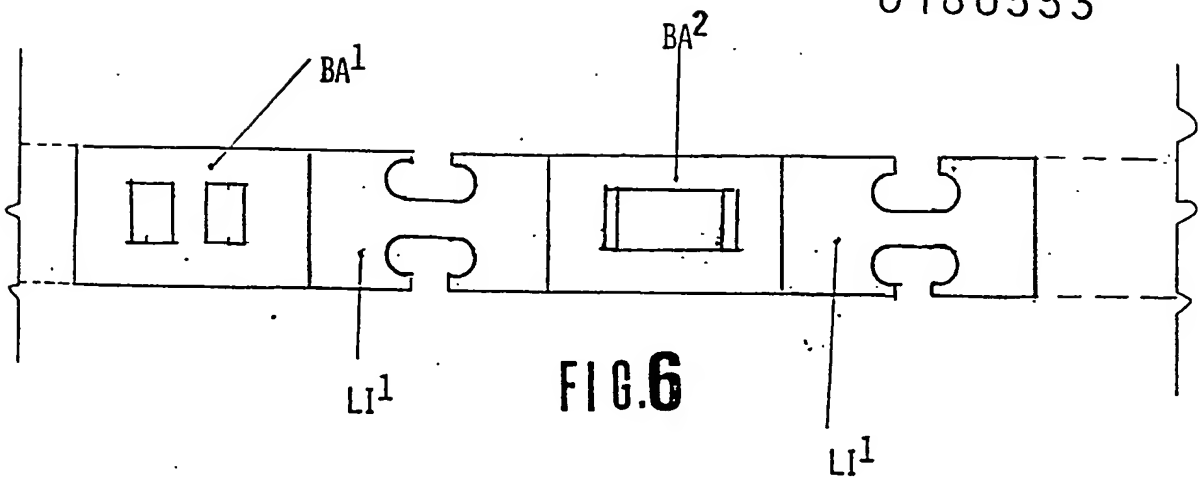


FIG.6

FIG.7

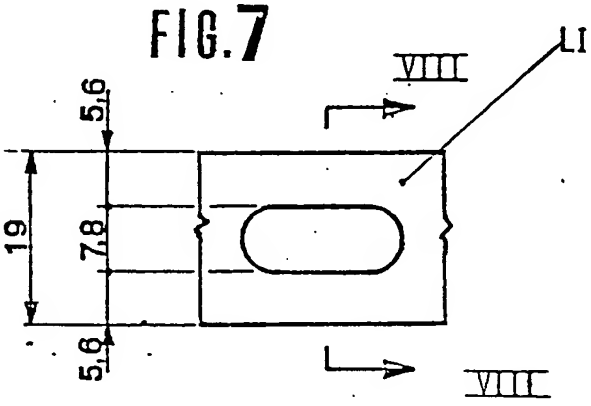
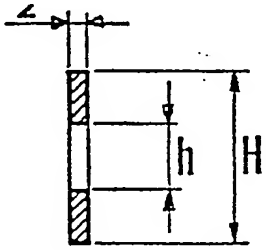


FIG.8



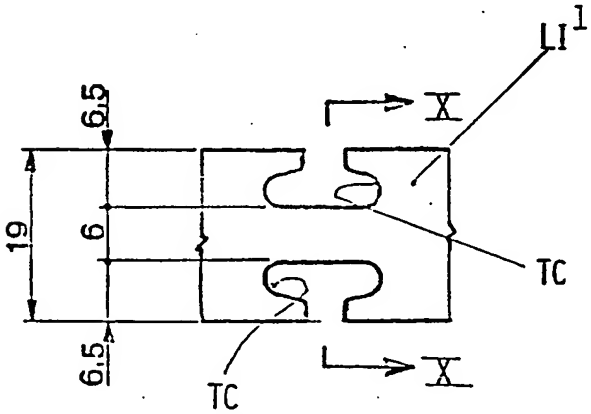


FIG.9

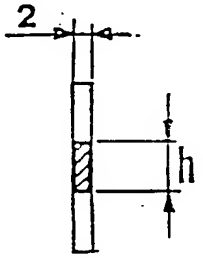


FIG.10

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EUROPEAN SEARCH REPORT

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Application number

EP 85 83 0251

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
1 A	AT-B- 374 917 (AUSTRIA-PLIBRICO) * Whole document *	1,3-5	F 27 D 1/10 F 23 M 5/04

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

F 27 D
F 23 M

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	05-12-1985	COULOMB J.C.

CATEGORY OF CITED DOCUMENTS

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